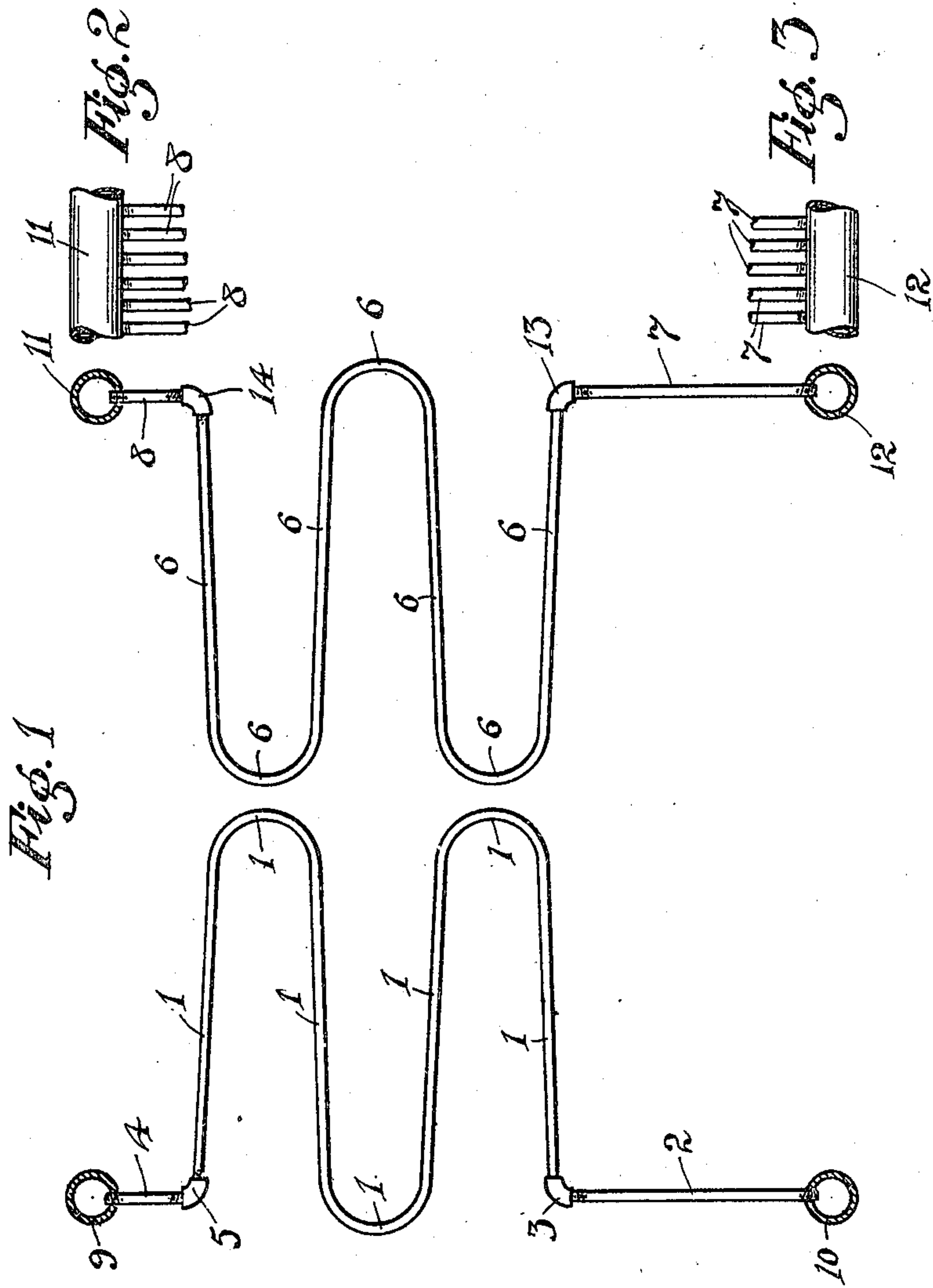


A. ANDERSON.
WATER HEATER OR STEAM GENERATOR.
APPLICATION FILED JAN. 28, 1909.

953,453.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5

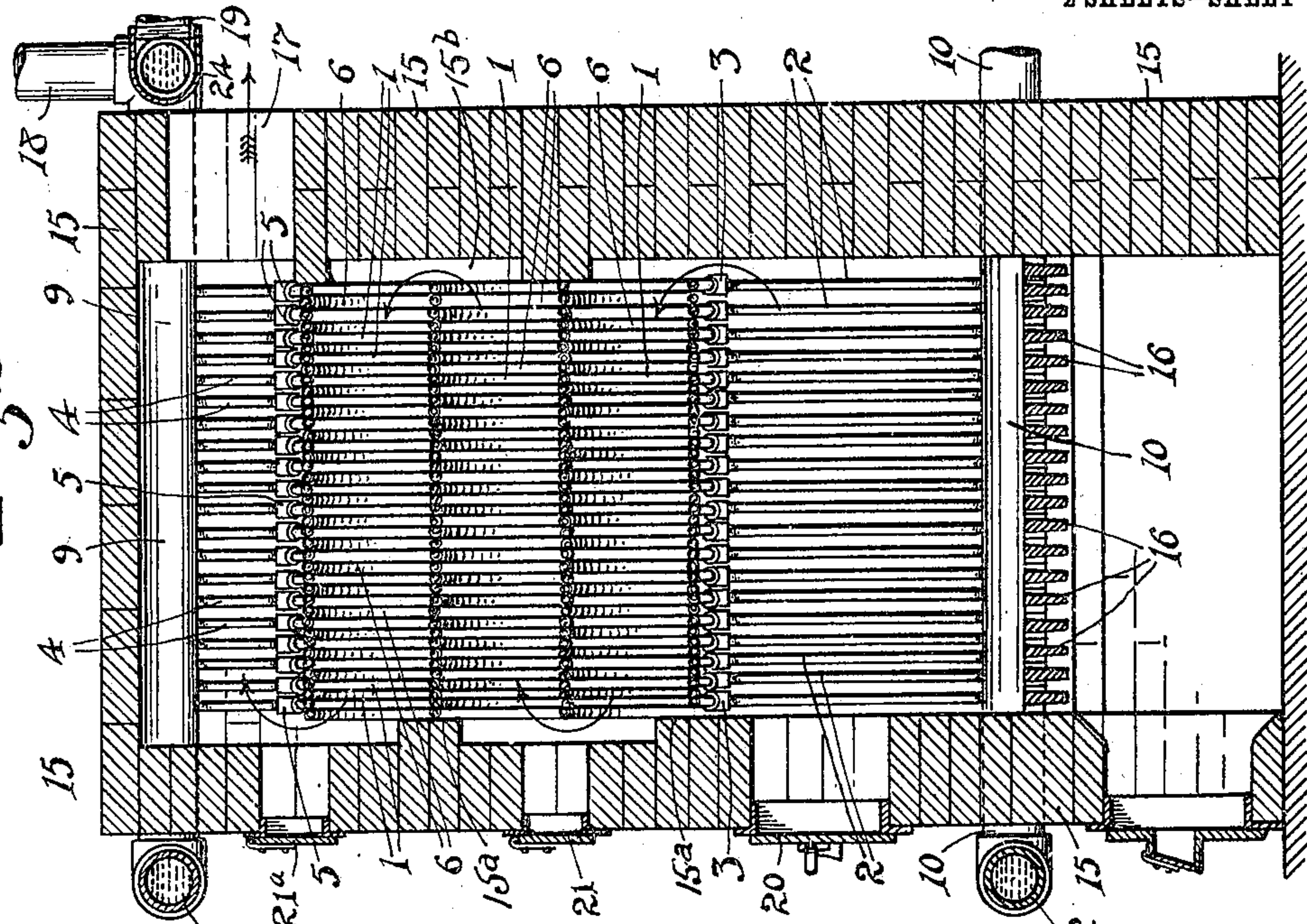
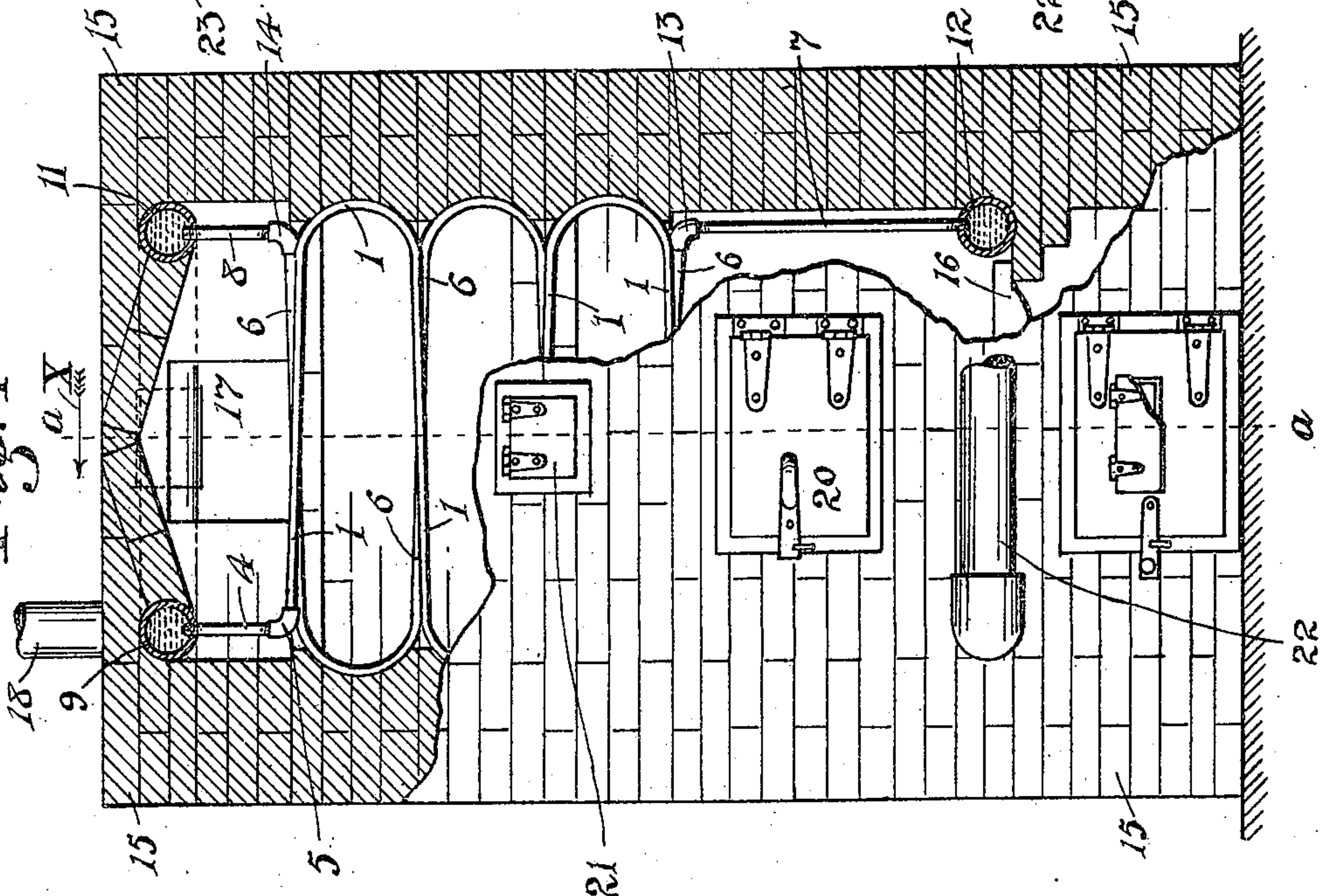


Fig. 4



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UNITED STATES PATENT OFFICE.

ALFRED ANDERSON, OF LOS ANGELES, CALIFORNIA.

WATER-HEATER OR STEAM-GENERATOR.

953,453.

Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed January 28, 1909. Serial No. 475,285.

To all whom it may concern:

Be it known that I, ALFRED ANDERSON, of the city of Los Angeles, in the county of Los Angeles, in the State of California, have invented Improvements in Water-Heaters or Steam-Generators, of which the following is a full, clear, and exact specification, reference being had to the annexed drawings and to the letters and figures marked thereon.

My said invention which relates to a new or improved apparatus applicable for the heating of water, is more especially adapted for heating water used in warming green-houses, hot-houses, conservatories, apartments in buildings, and for other such uses wherein hot water is applied for heating purposes. By constructing my said apparatus strong enough, it is applicable for the generation of steam for use under pressure.

The essential feature of the improvements constituting my invention consists in constructing the heating apparatus of pipes which are bent alternately backward and forward in one, two or more reduplications, the lower ends of these pipes being securely fastened into a water main at the bottom of the apparatus, and the upper ends of these pipes being correspondingly secured into a water main at the upper part of the apparatus. Two sets of such pipes, each set consisting of a number of pipes bent as aforesaid with their upper and lower ends respectively connected to the upper and lower mains of the apparatus, are placed interspacedly and closely together within a setting of brickwork, fireclay, or other material, and when operatively placed in the said setting the two series of bent pipes are so situated that part of the straight portion of each bend is close to, or in contact with a corresponding portion of the other series of bent pipes, so that the pipes of one series are situated in the spaces between the pipes of the other series, while there is formed between the bent pipes one, two, or more spaces through which the heated products of combustion of the fuel used for heating the apparatus pass, on the ascent of said heated products of combustion upward through the apparatus to a chimney or stack. In the lower part of the setting is a fire-grate, upon which coal, wood, or other solid fuel is burned, or one or more oil burners may be used in the fire-chamber of the setting to generate heat in the water flowing through the apparatus. The setting

is also provided beneath the fire-grate or furnace with a door for cleaning out ashes from an ashpit, and the setting is also provided with other doors for the purpose of passing in instruments,—brushes, scrapers, and the like,—for removing soot or other deposit from the fuel from off the heating pipes.

Upon the annexed drawings Figure 1, represents in elevation, the two sets of bent pipes attached to the upper and lower mains constituting two of the units of construction embodied in my invention. Fig. 2, is an elevation at right angles to Fig. 1, of one of the upper mains, showing the upper vertical portions of the bent water pipes as fastened into the bottom thereof. Fig. 3, is another elevation at right angles to Fig. 1, of one of the lower mains, showing the lower vertical portions of the bent water pipes as fastened into the top thereof. Fig. 4, is in part a front elevation, and in part a vertical section through the setting and through the upper and lower mains, showing the position which the bent pipes and mains as units of construction occupy when placed together operatively within the furnace setting. Fig. 5, is a vertical section on the line *a, a*, Fig. 4.

As shown by Figs. 1, 2, and 3, each left-hand unit of construction consists of the bent pipe 1, which is shown connected to the lower vertical pipe 2, by an elbow 3, and connected to the upper vertical pipe 4, by an elbow 5. The bent pipe 6, at the righthand side of Fig. 1, is the reverse of the bent pipe 1, at the lefthand side of said Fig. 1, and the upper and lower ends of the bent pipes 6, are connected to the lower vertical portions 7, and the upper vertical portion 8, by which the said pipes are fastened into the upper and lower mains 9, and 10, respectively, at the lefthand side of Fig. 1; and 11, and 12, respectively, at the righthand side of Fig. 1. The ends of the pipes 2, and 4, and 7, and 8, respectively, where they fasten into the mains 9, and 10, 11, and 12, respectively, and into the bends 3, and 5, 13, and 14, are constructed with right and lefthand screws, so that by rotating the pipes 2, and 4, 7, and 8, upon their axes the righthand screws respectively at the upper end of the pipes 4, and 8, and the lefthand screws respectively at the lower ends of the said pipes 4, and 8, simultaneously become screwed into right and lefthand tapped

holes in the mains 9, and 10, and in the elbows 5, and 14, while the right and left-hand screwed ends of the pipes 2, and 7, are similarly rotated, the upper ends enter into the elbows 3, and 13, and the lower ends into the mains 10, and 12. The arrangement of the pipes 4, and 8; 2, and 7; with right and left-hand screws at their upper and lower ends respectively, affords great facility for the purpose of assembling or connecting any number of bent pipes 1, and 6, with the upper and lower mains 9, and 10, and 11, and 12, of each set, series, or battery of the respective sets of pipes 1, and 6.

When ready for being placed in operative relationship in the furnace setting 15, Figs. 4, and 5, the bent pipes 1, of one set or battery, and the bent pipes 6, of the other set or battery, alternately occupy the spaces between each pair of pipes 1, and each pair of pipes 6, so that when in operative position the two sets of bent pipes 1, and 6, occupy the positions shown in Figs. 4, and 5, and the mains 9, and 11, 10, and 12, occupy the closer positions shown more especially at Fig. 4. When a fire is placed upon the fire-bars 16, the heat rises upward therefrom, and passes in the direction of the arrows shown in Fig. 5, through the spaces between each set of pipes 1, and 6, so that in ascending through the setting the heated products of combustion pass between and around each bend of the pipes 1, and 6, alternately in opposite directions, until the waste products of combustion are discharged by the flue 17, to a chimney or stack. To insure that the products of combustion ascending from the fire upon the bars 16, or from an oil burner or burners situated in the furnace of the heater, which pass alternately in opposite directions as indicated by the arrows in Fig. 5, the interior of the setting 15, is constructed with horizontal projections 15^a, at each side thereof, every such projection 15^a, at each side of the setting alternating with spaces 15^b, at the opposite side of the interior of the setting; thus constituting a zigzag passage for the heat and products of combustion in ascending from the fire on the fire bars 16, or from an oil burner or burners, through the flue 17, to a chimney or stack.

The water heated by the apparatus constituting my said invention, is led out of the apparatus by either a vertical pipe 18, or a horizontal pipe 19, which may extend through a greenhouse, hot-house, conservatory, or other apartment or apartments which my apparatus is applied to impart heat to, and the return pipe leading from

this external heating pipe, is connected to the main 10, or 12, constituting the lower part of the apparatus, by which arrangement continuous water connection is maintained throughout the apparatus, while the water is maintained in circulation through the apparatus in being heated, and distributes the heat generated into the greenhouses, hot-houses, conservatories, or other chamber or apartment.

The doors 20, 21, and 21^a, in the front of the setting 15, are for the purpose of being opened and sweeping or cleansing the interior of the apparatus, and setting free soot or other deposit.

The mains 10, and 12, are connected together by transverse pipes 22; and the mains 9, and 11, are connected together by the transverse pipes 23, and 24, thus insuring continuous water connection throughout the entirety of the mains, and throughout the entirety of the alternately forwardly and backwardly bent pipes 1, and 6.

For the purpose of preventing too great a pressure from being generated within the heater, one or more safety valves may be placed on one or both of the upper mains, but this is not necessary except where steam is to be generated under pressure.

I claim as my invention.

A heater and generator comprising a suitable casing having spaced walls, the front and rear walls being provided with suitable projections extending inwardly therefrom and being spaced apart, the projections on one wall being opposite the space between the projections on the other wall, two series of water tubes arranged in said casing, and connected at the top and the bottom of the casing to suitable inlet and outlet pipes or headers, the tubes of each series being bent into loops of a length substantially equal to the width of the casing, the loops in the respective series being interspaced and having the horizontal portions of said loops lying in contact and arranged opposite the projections on the walls of the casing, said projections and spaces there between together with the horizontal portions of the tubes, coacting to form a tortuous passage for the products of combustion.

In testimony whereof, I, the said ALFRED ANDERSON, have hereunto set my hand and seal at the city of Los Angeles aforesaid, in the presence of two subscribing witnesses.

ALFRED ANDERSON. [L. s.]

Witnesses:

ST. JOHN DAY,
J. D. CORY.